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Carbon Nanofibers Catalyzed by Iron Oxide Extracted from Mill Scale Waste for Microwave Absorbing Materials

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Abstract. Currently a wide range of materials are used for the design and development of microwave absorbing materials or radar absorbing materials (RAM). However, none of the materials use low-cost mill scale as a potential absorbing material. Materials from steel waste (mill scale) have been introduced in order to be used as low-cost filler. As-grown carbon nanofibers (CNF) from low-cost-mill scale with different milling time (4, 20, 40 h) was synthesized using chemical vapor deposition (CVD) method. As-grown CNF with lightweight characteristics were used as fillers showed a significant enhancement of reflection loss which can reaching -26 dB at 10.5 GHz. As the thickness increased from 1 mm to 3 mm, the reflection loss peak shifted towards lower frequency. Results showed that mill scale waste having nanometer starting particle size which was used as catalyst to grow CNF could enhanced the absorption capability.

Keywords: mill scale, carbon nanofibers, absorbing materials